UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/683,712	10/10/2003	Georg Bogner	12406-127001 / P2001,0258	2057

26161 7590 09/06/2007
FISH & RICHARDSON PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER	
NGUYEN, JOSEPH H	

ART UNIT	PAPER NUMBER
2815	

MAIL DATE	DELIVERY MODE
09/06/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/683,712	BOGNER ET AL.	
	Examiner	Art Unit	
	Joseph Nguyen	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 June 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-15,17-25,27,28,30,31,33-49,52 and 54-63* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4, 6-7, 9-15, 17-25, 27-28, 30-31, 33-35, 38-49, 52, 54-63* is/are rejected.

7)☒ Claim(s) *8,36 and 37* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-2, 6-7, 9, 12, 15, 17-18, 27-28, 30-31,33-35, 38, 43-46, 52, 55-58 and 60-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carey et al. in view of Shimozawa (JP 10-303464).

Regarding claims 1 and 17, Carey et al. discloses in figure 2 a housing for one light emitting component comprising a lead frame including a mount part having at least one wire connecting area; an opening formed therein and extending completely through the mount part; and at least one external electrical connecting trip 12; a separately manufactured thermal connecting part 10 disposed in said opening and fastened into said mount part, said thermal connecting part having at least one chip mounting area, wherein the thermal connecting part extends through the opening in the mount part and connects to the mount part at the opening to transfer heat away from the mount part; and a housing base formed from a molding compound (column 2, lines 22-25), wherein said lead frame is embedded in the base body to pass out said connecting trip from the

base body, the thermal connecting part has a thermal connecting surface thermally connectable from the outside, and the housing is a surface mounted housing having a bearing surface for the surface mounting with the thermal connecting surface extending to the bearing surface for conducting heat to an exterior surface to which the bearing surface mounts the housing (column 2, lines 44-49).

Carey et al. does not disclose the separately manufactured thermal connecting part to form electrical connection with the at least one external electrical connecting strip. However, Shimozawa discloses in figure 1 the separately manufactured thermal connecting part 10 forming an electrical connection with the at least one external electrical connecting strip 2 via the conductive adhesive 11 so that the heat can be further dissipated away from the LED in an efficient manner because the electrical connecting strip is formed of metal which can conduct heat efficiently. In view of such teaching, it would have been obvious at the time of the present invention to modify Carey et al. by including the separately manufactured thermal connecting part to form electrical connection with the at least one external electrical connecting strip so that the heat can be further dissipated away from the LED in an efficient manner because the electrical connecting strip is formed of metal which can conduct heat efficiently.

Regarding claim 2, Carey et al. discloses in figure 2 the mount part has one of an eye into which the thermal connecting part 10 is fastened.

Regarding claim 6, Carey et al. teaches in column 2, lines 26-31 the bond wires extend from the LED 16 and the surmount 18 to metal leads on lead frame. As such, the

wire connecting area must be disposed at a higher level than the chip mounting area as viewed from the chip mounting area.

Regarding claim 7, Carey et al. discloses in figure 2 the reflector well 14 has an edge; and the wire connecting area must be disposed above the edge as viewed fro the chi mounting area.

Regarding claim 9, Carey et al. discloses the thermal connecting part 10 having at least one chip mounting area and containing at least one of copper (column 2, lines 47-49).

Regarding claim 12, Carey et al. discloses the lead frame contains at least one of copper.

Regarding claim 15, Carey et al. discloses the radiation-emitting component is a light emitting diode component 16.

Regarding claim 18, Carey et al. discloses in figure 2 the chip mounting area and the thermal connecting surface are on opposite sides of the thermal connecting part 10.

Regarding claim 27, Carey et al. discloses the lead frame is surface mounted lead frame.

Regarding claim 28, Carey et al. discloses a housing for light emitting component comprising the lead frame of claim 1 and the light emitting component being light emitting diode 16.

Regarding claim 30, Carey et al. discloses a radiation emitting component comprising a radiation emitting chip 16 at least sheathed with a radiation permeable compound 20; and a housing for light emitting component having the lead frame.

Regarding claim 31, Carey et al. discloses the chip 16 is a semiconductor chip.

Regarding claims 33-34, Carey et al. discloses the radiation permeable compound 20 is a plastic compound of a molding compound (column 2, lines 31-34).

Regarding claim 35, Carey et al. discloses the plastic compound 20 contains at least one of a group consisting of silicone resin (column 3, lines 11-14).

Regarding claim 38, Carey et al. discloses the chip is a semiconductor chip 16 mounted on the chip mounting area of the thermal connecting part.

Regarding claim 43, Carey et al. discloses a wire connection (column 2, lines 27-30) electrically conductively connecting the chip to the wire connecting area.

Regarding claim 44, Carey et al. discloses in figure 2 a method for producing a semiconductor component comprises providing the mount part; fastening the thermal connecting part 10 having the chip mounting area into the opening (column 2, lines 22-24) formed in the mount part; fitting the radiation emitting chip 16 to the chip mounting area; and embedding the mount part and the thermal connecting part in a housing mold compound. See column 2.

Regarding claim 45, Carey et al. discloses connecting the thermal connecting part 10 to the mount part by riveting. Note that the heat sink must be fastened to the mount part in order to properly function as a heat sink and to firmly hold the chip 16.

Regarding claim 46, Carey et al. discloses fitting the chip to the chip mounting area before the mount part and the thermal connecting part are embedded in the housing molding compound.

Regarding claim 52, Carey et al. discloses in figure 2 a lead frame for a radiation emitting component comprising a first electrically conductive component having a mounting region and an electrical connecting trip 12 extending from the mounting region, the mounting region having an opening formed therein; and a separately manufactured thermal connecting part 10 disposed in the opening of the mounting region and secured to the mounting region to form an electrical connection with the first electrically conductive component, wherein the thermal connecting part comprises at least one chip mounting area and a reflector well 14 surrounding the chip mounting area, and wherein the opening extends completely through the first component and the thermal connecting part extends through the opening in the mounting region and connects to the mounting region at the opening to transfer heat away from the mounting region.

Regarding claim 55, Carey et al. discloses a light emitting diode 16 mounted in the chip mounting area.

Regarding claim 56, Carey et al. discloses the housing base body comprising the bearing surface.

Regarding claim 57, Carey et al. discloses the thermal connecting surface and the bearing surface are substantially planar.

Regarding claims 58 and 60, Carey et al. discloses the lead frame is a surface mountable component.

Regarding claim 61, Carey et al. discloses in figure 2 a housing for one light emitting component, said housing comprising the lead frame and a housing base body

formed from a molding compound wherein said lead frame is embedded in the base body to pas out said connecting strip from the base body.

Regarding claim 62, Carey et al. discloses in figure 2 the thermal connecting part has a thermal connecting surface thermally connectable from the outside, and the housing is a surface mounted housing having a bearing surface for the surface mounting with the thermal connecting surface extending to the bearing surface for conducting heat to an exterior surface to which the bearing surface mounts the housing.

Regarding claim 63, Carey et al. discloses the chip mounting area and the thermal connecting surface are on opposite sides of the thermal connecting part.

Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carey et al. and Shimozawa in view of Barnett et al. (US 6,903,380)

Regarding claims 3-4, Carey et al. and Shimozawa disclose substantially all the structure set forth in the claimed invention except the thermal connecting part and the mount part being connected by welding. However, Barnett et al. discloses in figure 2 the thermal connecting part 14 and the mount part 54 being connected by welding (col. 9, lines 62-65). In view of such teaching, it would have been obvious at the time of the present invention to modify Carey et al. and Shimozawa by having the thermal connecting part and the mount part being connected by welding to effectively provide an electrical connection (col. 9, line 66, Barnett et al.).

Claims 10-11 and 19-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carey et al. and Shimozawa in view of Waitl et al. (US 6,624,491).

Regarding claims 10, Carey et al. and Shimozawa disclose substantially all the structure set forth in the claimed invention except the chip mounting area having a surface coating. However, Waitl et al. discloses on figure 1 the chip mounting area having a surface coating 18 (col. 4, line 61) for improving mounting of a chip 1. In view of such teaching, it would have been obvious at the time of the present invention to modify Carey et al. and Shimozawa by having the chip mounting area having a surface coating to increase radiation input/output efficiency with the semiconductor chip (col. 3, lines 18-19).

Regarding claim 11, Waitl et al. discloses the surface coating is a silver coating (col. 5, lines 1-4).

Regarding claim 19, Carey et al. discloses in figure 2 substantially all the structure set forth in the claimed invention except the base body having a radiation outlet window, and said thermal connecting part embedded in the base body to dispose the chip mounting area in the radiation outlet window. However, Waitl et al. discloses on figure 2 the base body 10 having a radiation outlet window (col. 5, lines 17-19); and said thermal connecting part 3 (portion 3 of lead frame made of metal and can function as a thermal connecting part) embedded in the base body to dispose the chip mounting area in the radiation outlet window. In view of such teaching, it would have been obvious at the time of the present invention to modify Carey et al. by having the base body having a radiation outlet window, and said thermal connecting part embedded in the base body

to dispose the chip mounting area in the radiation outlet window to increase radiation input/output efficiency with the semiconductor chip (col. 3, lines 18-19).

Regarding claim 20, Waitl et al. discloses in figure 1 the radiation outlet window 10has sidewalls in the form of reflector surfaces (col. 5, lines 17-19).

Regarding claim 21, Waitl et al. discloses the radiation outlet window has reflective sidewalls 12 (col. 5, lines 19-20).

Regarding claim 22, the combination of Carey et al. and Waitl et al. discloses said thermal connecting part 20 has a reflector well 30 forming a first part of a reflector (figure 1 of Minoru); said sidewalls of the radiation outlet window 10 form a second part of the reflector (figure 1 of Waitl et al.); and said well 30 merges to the second part 12.

Regarding claim 23, Carey et al. and Waitl et al. disclose substantially all the structure set forth in the claimed invention except an overall height of the reflector being no greater than four times a height of the chip. However, it would have been an obvious matter of design choice to modify Carey et al. and Waitl et al. by having an overall height of the reflector being no greater than four times a height of the chip, since such modification would have been involved a component. A change in size is generally recognized as being within the level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CCPA 1955).

Regarding claim 24, the combination of Carey et al. and Waitl et al. discloses the chip 40 has a main emission direction; said reflector well 30 has reflector walls (figure 1 of Minoru); said radiation outlet window 10 has reflector surfaces 12 (figure 1 of Waitl et

al.); and said reflector walls and the reflector surfaces are at different angles with respect to the main emission direction.

Regarding claim 25, the combination of Carey et al. and Waitl et al. discloses an angle between the reflector walls 12 (figure 1 of Waitl et al.) and the main emission direction being greater than an angle between said reflector surfaces 30 (figure1 of Minoru) and the main emission direction.

Claims 13-14 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carey et al. and Shimozawa in view of Han et al. (US 2001/0054761 A1).

Regarding claim 13, Carey et al. and Shimozawa disclose substantially all the structure set forth in the claimed invention except at least one external electrical connecting strip having a surface coating. However, Han discloses in figure 3 one external electrical connecting strip 40 having a surface coating (para [0022], lines 4-5). In view of such teaching, it would have been obvious at the time of the present invention to modify Carey et al. and Shimozawa by having one external electrical connecting strip having a surface coating to provide an effective electrical connection of the semiconductor chip.

Regarding claim 14, Han discloses the surface coating is a gold coating (para [0022], lines 4-5).

Regarding claim 59, Carey et al. discloses in figure 1 the lead frame 12 is a surface mountable component.

Claims 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carey et al. and Shimozawa in view of Hochstein (US Patent NO. 6,517,218 B2).

Regarding claims 39-40, Carey et al. and Shimozawa disclose in figure 2 substantially all the structure set forth in claims 39-40 except the chip adhesively bonded to the chip mounting area. However, Hochstein discloses the chip 12 is connected to the chip mounting area by an adhesive bond 22 for securing the chip to the heat sink (column 3, lines 14-17). In view of such teaching, it would have been obvious at the time of the present invention to modify Carey et al. and Shimozawa by including the chip adhesively bonded to the chip mounting area for securing the chip to the thermal connecting part.

Claims 41-42 and 47-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carey et al. and Shimozawa in view of Matsumoto et al. (JP402187058).

Regarding claim 41, Carey et al. and Shimozawa disclose in figure 2 substantially all the structure set forth in the claimed invention except the chip being mounted on the chip mounting area by a silver solder. However, Matsumoto et al. discloses in figure 4 the chip 5 being mounted on the chip mounting area by a silver solder 6 (see Abstract). In view of such teaching, it would have been obvious at the time of the present invention to modify Carey et al. and Shimozawa by having the chip being mounted on the chip mounting area by a silver solder to improve heat radiation (Abstract of Matsumoto).

Regarding claim 42, it is inherent the silver solder has a melting temperature greater than 260 C.

Regarding claims 47-48, similar to rejection of claims 41-42 above, the combination of Carey et al. and Matsumoto discloses all steps of the method set forth in claims 47-48.

Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Carey et al. and Shimozawa in view of Mahulikar et al. (US Patent No. 5,608,267)

Regarding claim 49, Carey et al. and Shimozawa disclose in figure 2 substantially all the structure set forth in claim 49 except the mount part and the thermal connecting part compound being embedded by injection molding in the housing molding compound. However, Mahulikar et al. discloses in figure 2 the mount part (portion where device 12 is mounted on) and the thermal connecting part 26' is embedded in the housing molding compound 30 (column 6, lines 61-67). In view of such teaching, it would have been obvious at the time of the present invention to modify Carey et al. and Shimozawa by embedding the mount part and the thermal connecting part in the housing molding compound to effectively package a semiconductor device because injection molding is known as an effective method to form a semiconductor device package.

Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Carey et al. and Shimozawa in view of Huang (US 6664649).

Regarding claim 54, Carey et al. and Shimozawa disclose substantially all the structure set forth in claim 17 except an exterior surface to which the bearing surface mounting the housing. However, Huang discloses in figure 5 an exterior surface (printed circuit board) 560 to which the bearing surface (heat sink) 530 mounting the housing to further increase the heat dissipation efficiency (col. 5, lines 15-19). In view of such teaching, it would have been obvious at the time of the present invention to modify Carey et al. and Shimozawa by including an exterior surface to which the bearing surface mounting the housing to further increase the heat dissipation efficiency.

Allowable Subject Matter

Claims 8, 36 and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The reference (s) of record do not teach or suggest, either singularly or in combination at least the limitation of "said reflector well has height no greater than twice a height of the chip" for claim 8, "said radiation permeable compound has a volume described by the volume $V \leq q\ H$ where H is a height of said chip and q is a scaling factor having a value less than 10 mm^2 " for claim 36.

Response to Arguments

Applicant's arguments with respect to claims 1-4, 6-15, 17-25, 27, 28, 30, 31, 33-49, 52 and 54-63 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Nguyen whose telephone number is (571) 272-

1734. The examiner can normally be reached on Monday-Friday, 8:30 am- 5:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300 for regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KENNETH PARKER
SUPERVISORY PATENT EXAMINER

Joseph Nguyen

Patent Examiner

August 28, 2007.